



SKILLSHEET 7.2

Gradient of a straight line

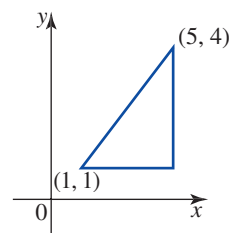
The gradient, m , of a straight line that passes through the points (x_1, y_1) and (x_2, y_2) , is given by the formula:

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

The gradient of a straight line remains constant.

WORKED EXAMPLE 1

State whether the gradient of the line joining the points $(1, 1)$ and $(5, 4)$ in the graph at right is positive or negative. Calculate the gradient.



THINK

- 1 The line has a positive gradient, because it rises from left to right.
- 2 Vertical rise $= 4 - 1$
 $= 3$
- 3 Horizontal run $= 5 - 1$
 $= 4$

WRITE

$$m = \frac{\text{vertical rise}}{\text{horizontal run}} \\ = \frac{3}{4}$$

The gradient is $\frac{3}{4}$.

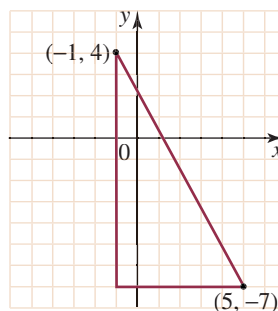
WORKED EXAMPLE 2

Find the gradient of the line joining the points $(-1, 4)$ and $(5, -7)$.

THINK

- 1 Draw a diagram.

WRITE



- 2 Vertical rise $= 4 - (-7)$
 $= 11$
- 3 Horizontal run $= -1 - 5$
 $= -6$

$$m = \frac{\text{vertical rise}}{\text{horizontal run}} \\ = -\frac{11}{6}$$

The gradient is $-\frac{11}{6}$.



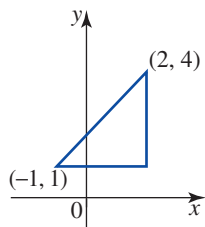
Try these

1 Calculate the gradient of each of the following, and hence state whether the gradient is positive or negative.

a rise = 3, run = 1

d run = 7, rise = -21

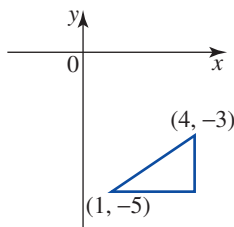
g



b rise = 8, run = 4

e run = -5, rise = 75

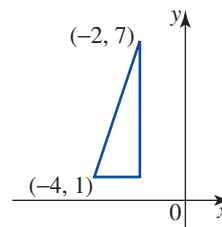
h



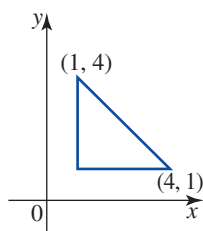
c rise = 15, run = -2

f run = 35, rise = 18

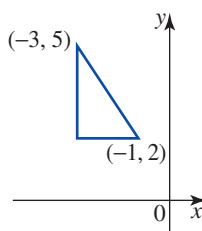
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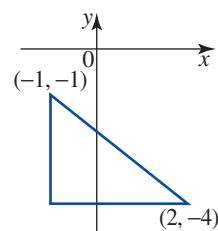
j



k



l



2 Find the gradient of the line joining each of the following pairs of points:

a (5, 2) and (7, -3)

c (-1, -3) and (-5, 1)

e (2.5, 3) and (7.5, 6)

b (-2, 2) and (4, 10)

d (1, 1) and (5, 5)

f (-3, -2) and (-8, -12)



SKILLSHEET — ANSWERS

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Gradient of a straight line

- | | | |
|---------------------------|------------------------------------|-------------------------------------|
| 1 a 3; positive | b 2; positive | c $-\frac{15}{2}$; negative |
| d -3; negative | e -15; negative | f $\frac{18}{35}$; positive |
| g 1; positive | h $\frac{2}{3}$; positive | i 3; positive |
| j -1; negative | k $-\frac{3}{2}$; negative | l -1; negative |
| 2 a $-\frac{5}{2}$ | b $\frac{4}{3}$ | c -1 |
| d 1 | e $\frac{3}{5}$ | f 2 |